

Branched alkanes with quaternary carbon centers in a sulfidic Yellowstone mudpot

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Branched alkanes with quaternary carbon centers (BAQCs) are enigmatic molecules with presumed biogenic origin but without an identified microbial source. These compounds have high preservation potential because of their resistance to biodegradation, and have been identified in diverse Phanerozoic and Precambrian sediments (Kenig et al., 2003, Greenwood et al., 2004) where their distributions suggest association with strong paleoredox gradients. This has led previous authors to conclude that the source organisms for these compounds are likely to be non-photosynthetic, autotrophic, and thermophilic, and potentially associated with sulfide oxidation.

We have identified several series of BAQCs by GC-MS in the saturated hydrocarbon fraction of an acid 90°C sulfidic mudpot in Yellowstone National Park. The predominant series were 5, 5-diethylalkanes with carbon chain lengths displaying odd over even predominance. Other series included 3, 3-dimethylalkanes and 6, 6-diethylalkanes. The occurrence of these compounds in a modern system offers the potential to identify the source organism with microbiological techniques. We will survey clone libraries of amplified microbial DNA from this environment in order to identify candidate organisms for production of these enigmatic biomolecules.

Greenwood, P.F., Arouri, K.R., Logan, G.A., Summons, R.E. 2004 Abundance and geochemical significance of C_{2n} dialkylalkanes and highly branched C_{3n} alkanes in diverse Meso- and Neoproterozoic sediments. *Organic Geochemistry* 25:331-346

Kenig, F., Simons, D.-J.H., Crich, D., Cowen, J.P., Ventura, G.T., Rehbein-Khalily, T., Brown, T.C., Rehbein, T., 2003. Branched alkanes with quaternary substituted carbon atoms in modern and ancient geological samples. *Proceedings of the National Academy of Sciences USA* 10/22, 12554-12558.